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view. In due time, twenty-seven days from its first appearance, a field of faculae and a slight irregularity in the contour of the limb was discernible far to the south. This was on the 1st of November, 10:30 A.M. At noon the penumbra was visible, and at 4 P.M. the foremost umbra as a faint dark line. As the two sections advanced, they were seen to be much decreased in size and changed in form, but several degrees in the rear was a large scattered group, probably a development from the small spot above mentioned. When central in the southerly zones, this addition was about 70,000 miles in length, and made the group again visible to the unaided eye on clear days. Even more distinct was a conspicuous group with large umbræ in north latitude 15° that had appeared on the east limb on the 29th of October, while near the southwest limb was a rather large group that had come in on the 25th of the same month.

Though larger spots have been seen than any one of these three, the extent of spotted area at one time has not been equaled since 1894.

PLANETARY PHENOMENA FOR JANUARY AND
FEBRUARY, 1904.

BY MALCOLM MCNEILL.

PHASES OF THE MOON, PACIFIC TIME.

Full Moon, Jan. 2,	9 ^h 47 ^m P.M.	Full Moon, Feb. 1,	8 ^h 33 ^m A.M.
Last Quarter, " 9,	1 10 P.M.	Last Quarter, " 8,	1 56 A.M.
New Moon, " 17,	7 47 A.M.	New Moon, " 16,	3 5 A.M.
First Quarter, " 25,	12 41 P.M.	First Quarter, " 24,	3 9 A.M.

The year 1904 is a leap-year, the first since 1896, and the regular succession of leap-years every fourth year will not be interrupted until the year 2100.

The Earth is in perihelion January 2d, 8 P.M., Pacific time.

Mercury is an evening star at the beginning of January, having reached its greatest east elongation, $19^{\circ} 30'$, just before midnight on December 31st. The elongation is not a very large one, as the planet passes perihelion only a few days later, on January 10th, but it remains above the horizon for an hour and

a half after sunset on January 1st, and may be easily seen shortly after sunset under good weather conditions. It rapidly approaches the Sun, and can be seen as an evening star for only a few days. It reaches inferior conjunction on January 17th, and becomes a morning star, attaining greatest west elongation on the morning of February 10th. This elongation, $25^{\circ} 52'$, is much larger than the east elongation of January, as *Mercury* is nearly at aphelion; but as the planet is 5° south of the Sun the interval between the rising of the planet and of the Sun is about the same on February 1st, and continues to be as much as an hour until nearly February 20th. *Mercury* is in rather close conjunction with *Saturn* on the morning of February 26th, the former being $0^{\circ} 49'$ south of the latter at the time of nearest approach, 9 P.M., February 25th. They are both rather too near the Sun to be seen with the naked eye, except in especially fine weather.

Venus is a morning star, rising three and one half hours before sunrise on January 1st; but its more rapid eastward motion among the stars brings it nearer the Sun, and by the end of February it rises only about an hour and one half before sunrise. On the morning of January 11th it passes the first-magnitude star *Antares*, a *Scorpii*, about 7° north of the star. It passes less than 2° north of *Uranus* on January 28th; on the evening of February 12th it is 4° south of the Moon, and at the end of the month it is a little east of *Saturn*.

The year 1904 is a poor one for observations of *Mars*, as it is going through the part of its orbit which is farthest away from the Earth. However, its direction is still far enough away from that of the Sun so that it may be easily seen as an evening star. It does not set until about three hours after sunset on January 1st, and at the end of February a little less than two hours after. Its rapid eastward and northward motion among the stars has the rather unusual effect of making its time of setting almost exactly the same for the whole two months' period, the whole range being from 7:35 to 7:38 P.M., local mean time. It passes the vernal equinox about noon on February 26th, about $0^{\circ} 40'$ south. Also, on the evening of February 25th, it is in close conjunction with *Jupiter*, being about $0^{\circ} 30'$ north of the latter. This distance is about the apparent diameter of the Sun or Moon.

Jupiter is also an evening star, and is in comparatively good position for observation until March 1st. It does not set until well after 10 P.M. on January 1st, and at a little before 7:30 on February 29th. During the two-month period it moves about 11° eastward and 5° northward, passing the vernal equinox about 1° southward on February 28th. There will be a near approach to the Moon on the evening of February 18th. Its conjunction with *Mars* on February 25th has already been mentioned.

Saturn will be too near the Sun for easy observation during the greater part of the period. At the beginning it is still an evening star, setting about two hours after the Sun, but passes conjunction and becomes a morning star on February 1st. By the end of the month it rises about an hour before sunrise. It can then be seen with the naked eye if the weather is very clear; but it cannot be seen as near the Sun as *Jupiter* or *Venus*, as these are much brighter. Its conjunction with *Mercury* on the night of February 25-26th has been mentioned.

Uranus is a morning star, rising at about an hour before sunrise on January 1st, and at a little before 3 A.M. on February 29th. It is so faint that it cannot easily be seen until it is two hours or more above the horizon.

Neptune is an evening star, or rather it is both evening and morning star, having passed opposition with the Sun on December 27th, and being above the horizon nearly the entire night. It is in the western part of *Gemini*.